

1.) What is the definition of a probability distribution?

2.) What are the two requirements for a probability distribution?

a.)

b.)

3.) Are the following distributions probability distributions? If not, provide a reason.

x	$P(x)$
0	0.04
1	0.16
2	0.80
3	0.16
4	0.04

x	$P(x)$
0	0.4219
1	0.4219
2	0.1406
3	0.0156

4.) What is the formula for:

a.) The mean of a probability distribution.

b.) The standard deviation of a probability distribution.

5.) A researcher wanted to know: Are we influenced to buy a product by an ad we saw on TV? National Infomercial Marketing Association determined the number of times buyers of a product watched a TV infomercial before purchasing the product. The results are shown here:

Number of times buyers saw infomercial	Percentage of Buyers
1	27%
2	34%
3	18%
4	9%
5	15%

a.) Is this a probability distribution? Why or why not?

b.) Calculate the mean and standard deviation for the distribution:

x	$P(x)$	$x \cdot P(x)$	x^2	$x^2 \cdot P(x)$

A **Binomial** probability distribution is a specific type of Discrete probability distribution where the results of each trial can be reduced to 2 outcomes.

6.) What are the four requirements for a Discrete probability distribution?

- | | |
|-----|-----|
| 1.) | 2.) |
| 3.) | 4.) |

7.) Explain why each of the following IS or IS NOT a binomial probability distribution:

- a.) In the game of cribbage each person is dealt a hand of 6 cards. You are concerned with how many face cards you are dealt.
- b.) You pick 100 people randomly and record if they have green eyes or not.
- c.) Suppose you toss a die 5 times. You record the number that faces up each time the die lands.

Binomial probability distribution Questions:

8.) The probability that a student is accepted to a prestigious college is 0.3. If 5 students from the same school apply, what is the probability that exactly 2 are accepted? Is this probability unusual?

$n =$ $p =$

$x =$ $q =$

9.) Suppose individuals with a certain gene have a 0.70 probability of eventually contracting a certain disease. If 20 individuals with the gene participate in a lifetime study, what is the probability that 18 of them will contract the disease? Is this probability unusual?

$n =$ $p =$

$x =$ $q =$

10.) You take a multiple choice quiz that consists of 10 questions. Each question has four possible answers, only one of which is correct. To complete the quiz, you randomly guess the answer to each question. This is a binomial experiment because you either get each question right or wrong.

$n =$ $p =$ $q =$ $x =$

What is the probability that you get:

- | | |
|--------------------------------|--------------------------------|
| 1.) Exactly 3 questions right? | 2.) Exactly 2 questions right? |
| 3.) Exactly 1 question right? | 4.) Exactly 0 questions right? |

Expected Value

The expectation of a random variable $E(x)$ "what happens on average" is:

the sum of the products of values to be received and the probability of receiving that value.

In other words: $\sum [x \cdot p(x)]$

11.) Use the information in the table below to set up an expected value table the way you learned in class.

A dairy farmer estimates for the next year the farm's cows will produce about 25,000 gallons of milk. Because of variation in the market price of milk and cost of feeding the cows, the profit per gallon may vary with the probabilities given in the table below. Estimate the profit on the 25,000 gallons.

Gain per gallon	\$1.10	\$0.90	\$0.70	\$0.40	\$0.00	-\$0.10
Probability	0.30	0.38	0.20	0.06	0.04	0.02

12.) A construction company wants to submit a bid for remodeling a school. The research and planning needed to make the bid cost \$4000. If the bid were accepted, the company would make \$26,000. Would you advise the company to spend the \$4000 if the bid has only 20% probability of being accepted? Explain your reasoning.

13.) Suppose the warranty period on your family's new television is about to expire and you are debating about whether to buy a one-year maintenance contract for \$35. If you buy the contract, all repairs for one year are free. Consumer information shows that 12% of the televisions like yours require an annual repair that costs \$140 on the average. Would you advise buying the maintenance contract? Explain your reasoning.